that the studied leaves, especially *kimalindi*, may be used in dressing of wounds involving fungal infections (*C. albicans* and *C. neoformans)* and also *S. aureus*, all of which are common wound infections. Antioxidant activity was evaluated by measuring the ability of extracts from *kimalindi*, *mlelembo* and *ijuhi inkundu* to scavenge 2,2-Diphenyl-1-picrylhydrazyl (DPPH) free radical. Results revealed that the scavenging of methanolic DPPH solution was in the order of ascorbic acid >*kimalindi*> *ijuhi inkundu*> *mlelembo,* these results also affirming that *kimalindi* extract had better scavenging of DPPH solution, and hence presents better antioxidant activity, compared to the other two leaves extracts *(ijuhi inkundu* and *mlelembo).*

In conclusion, the herein studied biological properties and safety profile of extracts from locally grown banana leaves *(ijuhi inkundu*, *mlelembo* and *kimalindi)* affirmed their possible use for wound dressing. Findings from this study also suggest that, *kimalindi* leaves present better option when choosing which banana leaves among the three is to be used for wound dressing, based on results from antimicrobial, anti-oxidant and toxicity studies. Finally, this alternative wound dressing biomaterial need to be tested in a controlled clinical trial and compared with modern wound dressing material, in order to get them licensed as medical devices.

References

1. *Gore M. A., Akolekar D.* // Burns. (2003). Vol. 29. P. 483-486.
2. *Wolfram H., Emmanuella G., Matthias M. //* Expert Review of Dermatology (2013). Vol. 8. P. 439–440.

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EFFECT OF BIOCHAR ON THE GROWTH OF *RICINUS COMMUNIS* GROWN ON COPPER SMELTER WASTE: A POT SCALE STUDY*

Keywords: heavy metals, *Ricinus communis*, biochar, accumulation, biomass.

Both natural and anthropogenic activities resulted in enhanced release of heavy metals into the environment, resulting in its rapid transfer to the plants and other living organisms [1]. Biochar is a carbonaceous material produced by pyrolysis of agricultural and forestry residual biomass, can acts as an effective amendment for immobilizing heavy metals in contaminated soils and for improving the plant biomass [2]. However, combined application of compost with biochar was especially effective at the lower rate of biochar addition and can show improved effect on plant growth [3].

Short term pot scale study was conducted on the slag collected from the smelter, amended with 1 % and 3 % of biochar along with other amendments (compost and soil), to investigate its effect on metal and macro element accumulation (Ni, Fe, Ca and Mg) and growth of *Ricinus communis* (Castor). Addition of 1 % of biochar, showed improved plant growth (number of leaves, number of seeds, root and shoot length) along with reduced accumulation of Ni in root and its meager transfer to shoot compared to other treatments. Moreover, with some exceptions, it also increased Fe, Ca and Mg accumulation in both root and shoot. Treatment with 3 % biochar also showed better results for lower accumulation of Ni however, the plant growth parameters were lower as compared to the treatment with 1 % of biochar.

The study suggests addition of biochar along with amendments reduced the bioavailability of Ni by immobilization it on the substrate which resulted in its reduced accumulation in below ground and aerial parts of plant. In addition, increase in Fe, Ca and Mg helped as macro element for improved plant growth. Further, long term studies are required to understand the main effect of biochar on plants along with its physiology and biochemistry.

References

1. *Kumar A., Maleva M., Kiseleva I. et al.* // Environmental Geochemistry and Health. 2019. P. 1–12. *In press.*
2. *Yang X., Liu J., McGrouther K. et al.* // Environmental Science and Pollution Research. 2016. Vol. 23. P. 974–984.
3. *Jones S., Bardos R. P., Kidd P. S. et al.* // Journal of Environmental Management. 2016. Vol. 171. P. 101–112.

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